AMENDMENTS TO THE CLAIMS

The following Listing of Claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (withdrawn): A copper alloy for welding electrodes, wherein the copper alloy contains as second element, which does not dissolve or scarcely dissolves in copper in a solid solution state at room temperature, said second element being selected from the group consisting of chromium (Cr), zirconium (Zr), beryllium (Be), titanium (Ti) and boron (B), respective addition ratios of the second element being Cr: 0.1 to 1.4 wt%, Zr: 0.15 to 0.5 wt%, Be: 0.1 to 3.0 wt%, Ti: 0.1 to 6.0 wt%, B: 0.01 to 0.5 wt%, and wherein the alloy has an average crystal grain size of not more than 20 μm, the second element precipitates among crystal grains, and the copper alloy has a hardness of not less than 30 HRB, an electrical conductivity of not less than 85 IACS%, and a thermal conductivity of not less than 350 W/(m·K).

Claims 2-4 (cancelled)

Claim 5 (currently amended): A method ~~of~~ for manufacturing a copper alloy ~~for~~ welding ~~electrodes~~ electrode tip of a welding machine, comprising the steps of:

enabling any of chromium (Cr), zirconium (Zr), beryllium (Be), titanium (Ti) and boron (B) to dissolve in a solid solution in a base-material metal (Cu) as a second element that does not dissolve or scarcely dissolves

in copper in a solid solution state at room temperature, wherein respective addition ratios of the second element being Cr: 0.1 to 1.4 wt%, Zr: 0.15 to 0.5 wt%, Be: 0.1 to 3.0 wt%, Ti: 0.1 to 6.0 wt%, B: 0.01 to 0.5 wt%,

applying a strain equivalent to an elongation of not less than 200% to this material to achieve crystal grain refinement, and

subjecting this material to aging treatment simultaneously with or subsequent to application of this strain, thereby promoting precipitation of the second element among crystal grains.

Claim 6 (cancelled)

Claim 7 (currently amended): The method ~~of~~ for manufacturing a copper alloy ~~for~~ welding ~~electrodes~~ electrode tip of a welding machine according to claim 5, wherein strain is applied to the material by any of extruding, drawing, shearing, rolling and forging.

Claim 8 (currently amended): The method ~~of~~ for manufacturing a copper alloy ~~for~~ welding ~~electrodes~~ electrode tip of a welding machine according to claim 7, wherein strain is applied by extruding the material, and extrusion conditions are such that lateral extrusion is performed at a material temperature of 400 to 1,000°C, a die temperature of 400 to 500°C, and an extrusion speed of 0.5 to 2.0 mm/sec.

Claim 9 (currently amended): The method ~~of~~ for manufacturing a copper alloy ~~for~~ welding ~~electrodes~~ electrode tip of a welding machine according to claim 5, wherein the material is subjected to aging treatment before a strain is applied to the material.

Claim 10 (withdrawn): A composite copper material for welding electrodes, wherein an alumina powder or a titanium boride powder is dispersed in a copper matrix in an amount of 0.1 to 5.0 wt%, said composite copper material has a hardness of at least 30 HRB, an electrical conductivity of at least 85 IACS%, and a thermal conductivity of at least 350 W/(m·K).

Claims 11-13 (cancelled)

Claim 14 (withdrawn): A method of manufacturing a composite copper material, comprising the steps of:

mixing a copper powder and a ceramic powder together to forming a mixed powder as a primary shaped body, and

applying a strain to said primary shaped body to form a secondary shaped body in which base material and ceramic particles are combined together with refined particle sizes,

wherein an average particle size of the ceramic powder is between about 0.3 to 10 μm, the strain applied to the primary shaped body is equivalent to an elongation of not less than 200%, the strain is applied by extruding the primary shaped body that is performed at a material temperature of not less than 400°C but not more than

1,000°C and a die temperature of not less than 400°C but not more than 500°C, wherein an average particle size of a base material of the secondary shaped body to be obtained is not more than 20 μm, and the average particle size of ceramic particles is not more than 500 nm.

Claim 15 (cancelled)

Claim 16 (withdrawn): The method of manufacturing a composite copper material according to claim 14, wherein the primary shaped body is obtained by green compacting or by filling the mixed powder in a tube.

Claim 17 (cancelled)

Claim 18 (withdrawn): A method of manufacturing a composite copper material in which titanium boride is dispersed in a copper matrix, comprising the steps [1] to [3] of:

[1] mixing a copper powder, a titanium powder and a boron powder together to form a primary shaped body;

[2] applying thermal energy to the primary shaped body and thereby causing the titanium powder and the boron powder to react with each other in order to form titanium boride in the copper matrix; and

[3] applying a strain to the primary shaped body, in which the titanium boride is formed, by plastically deforming the primary shaped body and thereby forming a secondary shaped body.

Claim 19 (withdrawn): The method of manufacturing a composite copper material according to claim 18, wherein the secondary shaped body is subjected to heat treatment while applying the strain by plastic deformation or following application of the strain.

Claim 20 (withdrawn): The method of manufacturing a composite copper material according to claim 18, wherein plastic deformation involves applying a strain equivalent to an elongation of not less than 200%.

Claim 21 (withdrawn): The method of manufacturing a composite copper material according to claim 18, wherein the plastic deformation is extrusion that is performed at a material temperature of not less than 400°C but not more than 1000°C.

Claim 22 (withdrawn): The method of manufacturing a composite copper material according to claim 18, wherein the plastic deformation is extrusion that is performed at a die temperature of not less than 400°C but not more than 500°C.

Claim 23 (withdrawn): The method of manufacturing a composite copper material according to claim 18, wherein the primary shaped body is obtained by green compacting or by filling a mixed powder in a tube.

Claim 24 (withdrawn): The method of manufacturing a composite copper material according to claim 18, wherein an average particle size of the ceramic

powder is 0.3 to 10 μm, an average particle size of a base material of the secondary shaped body to be obtained is not more than 20μm, and an average particle size of titanium boride particles is not more than 500 nm.